

What is claimed is:

1 1. A method for fabricating a floating gate,
2 comprising:

3 providing a semiconductor substrate, wherein a oxide
4 layer, a first conducting layer, and a patterned
5 hard mask layer having a opening are sequentially
6 formed on the semiconductor substrate;

7 forming a spacer on the sidewall of the opening;

8 forming a second conducting layer on the patterned hard
9 mask layer and filling the opening;

10 planarizing the second conducting layer to expose the
11 surface of the patterned hard mask layer;

12 oxidizing the surface of the second conducting layer to
13 form an oxide layer; and

14 removing the patterned hard mask layer and the oxide layer
15 and the first conducting layer underlying the
16 patterned hard mask layer.

1 2. The method for fabricating a floating gate as claimed
2 in claim 1, wherein the oxide layer comprises a gate oxide
3 layer.

1 3. The method for fabricating a floating gate as claimed
2 in claim 1, wherein the first conducting layer comprises a
3 poly layer.

1 4. The method for fabricating a floating gate as claimed
2 in claim 1, wherein the patterned hard mask layer comprises
3 a nitride layer.

1 5. The method for fabricating a floating gate as claimed
2 in claim 1, wherein the second conducting layer comprises a
3 poly layer.

1 6. The method for fabricating a floating gate as claimed
2 in claim 1, wherein the planarizing step uses chemical
3 mechanical polishing.

1 7. The method for fabricating a floating gate as claimed
2 in claim 1, wherein the oxide layer comprises a siliziumoxid
3 layer.

1 8. A method for fabricating a floating gate,
2 comprising:
3 providing a semiconductor substrate;
4 sequentially forming a gate oxide layer, a first poly
5 layer, and a patterned hard mask layer having a
6 opening thereon, wherein the partial surface of the
7 first poly layer is exposed by the opening;
8 conformably forming an insulating layer over the
9 patterned hard mask layer and the opening;
10 anisotropically etching the insulating layer to form a
11 spacer on the sidewall of the opening;
12 conformably forming a second conducting layer on the
13 surfaces of the patterned hard mask layer and the
14 opening and the spacer, wherein the opening is filled
15 with the second poly layer;
16 chemical mechanical polishing the second poly layer to
17 expose the surface of the patterned hard mask layer;
18 partially oxidizing the surface of the second conducting
19 layer to form an oxide layer; and

20 removing the patterned hard mask layer and the gate oxide
21 layer using the oxide layer as a mask.

1 9. The method for fabricating a floating gate as claimed
2 in claim 8, wherein the patterned hard mask layer comprises
3 a nitride layer.

1 10. The method for fabricating a floating gate as claimed
2 in claim 8, wherein the insulating layer comprises an oxide
3 layer.

1 11. A floating gate, comprising:
2 a first conducting layer having a first tip; and
3 a second conducting layer having a second tip, wherein
4 the second conducting layer is formed on the first
5 conducting layer and a floating gate with multiple
6 tips is constructed by the first conducting layer
7 and the second conducting layer.

1 12. The floating gate as claimed in the claim 11, wherein
2 the first conducting layer comprises a poly layer.

1 13. The floating gate as claimed in the claim 11, wherein
2 the second conducting layer comprises a poly layer.

1 14. The floating gate as claimed in the claim 11, wherein
2 the top portion is narrower than the bottom portion of the
3 second conducting layer.

1 15. The floating gate as claimed in the claim 14, wherein
2 the width of the top portion of the second conducting layer
3 is equal to the width of the top portion of the first conducting
4 layer.

1 16. A floating gate, comprising:

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2 a first conducting layer having a first top portion with
3 a first tip and a first bottom portion; and
4 a second conducting layer having a second top portion
5 with a second tip and a second bottom portion, wherein
6 the second conducting layer is formed on the first
7 conducting layer, the width of the second top portion
8 is equal to the width of the first top portion, the
9 second bottom portion is narrower than the the first
10 top portion, and a floating gate with multiple tips
11 is constructed by the first conducting layer and
12 the second conducting layer.

1 17. The floating gate as claimed in the claim 16, wherein
2 the first conducting layer comprises a poly layer.

18. The floating gate as claimed in the claim 16, wherein
the second conducting layer comprises a poly layer.